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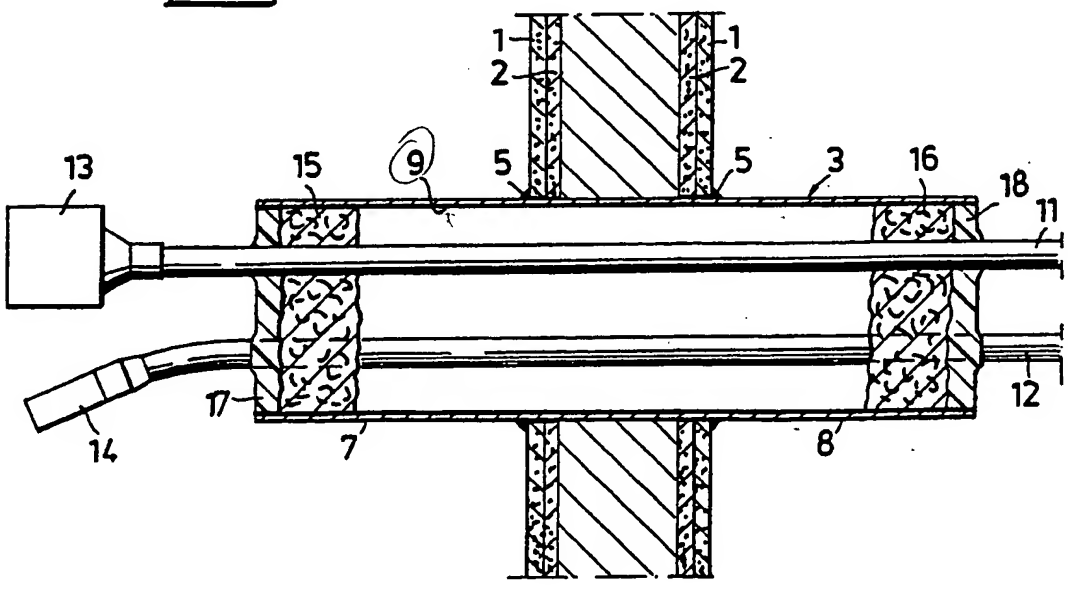
(54) Fireproof lead-through conduit

(57) Lead-through device for cables (11, 12) through a fire cell boundary (1, 2). A steel tube (3) is fireproof mounted through the boundary. A tube end part (7, 8) which may be exposed to fire, projects out from at least one side. At least th projecting pipe part has a thin layer (9) of intumescent material on its inner wall. The tube is overdimensioned in relation to cable diameters involved, and for preventing venting through it at an early stage of a fire, before the intumescent material has expanded, there is a seal (15, 17; 16, 18) at least at one tube end, preferably in the form of a plug (15, 16) of mineral wool, and optionally silicon cement (17, 18).

Fig.1



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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Fig. 1

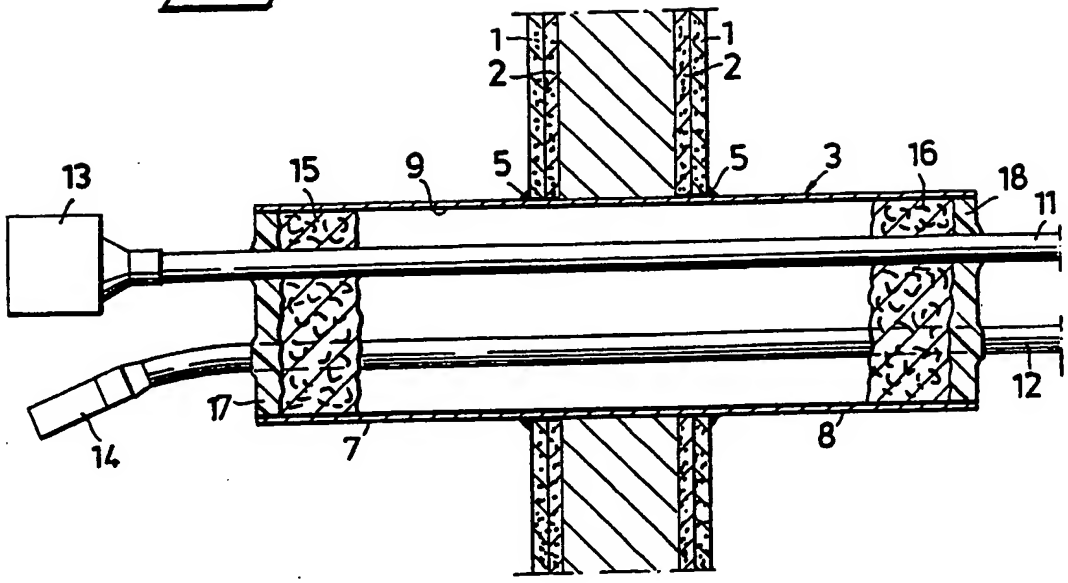


Fig. 2

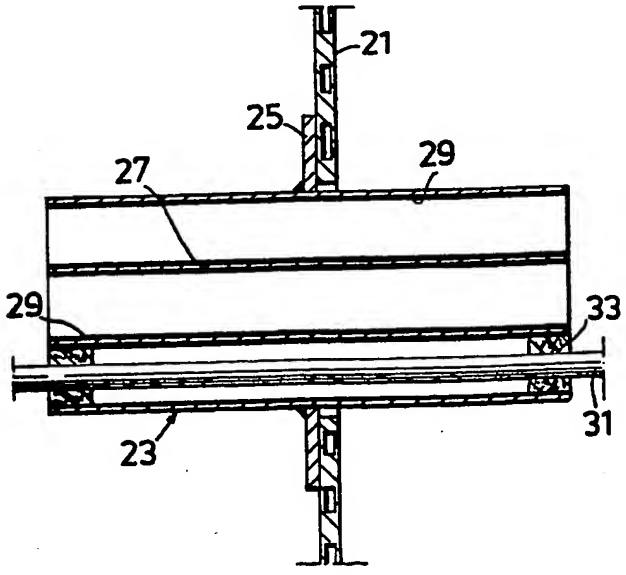
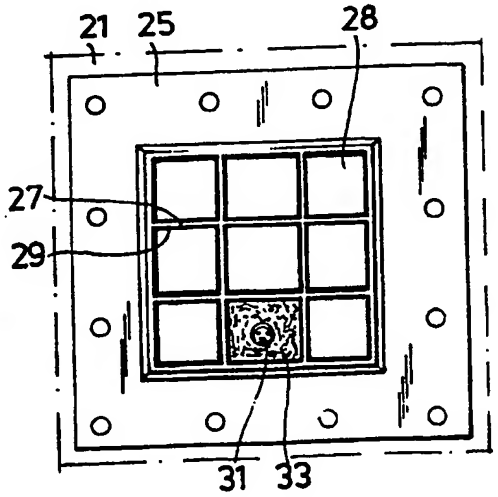


Fig. 3



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L ad-through device

TECHNICAL Field

The present invention relates to cable conduits or lead-through devices in a fire cell boundary, these devices preventing, in the case of fire, that fire, gas or smoke is spread via the conduit.

BACKGROUND ART

In connection with fire, the risk is great that fire, gas and smoke migrate through conventional, tubular conduits for cables etc. in fire cell boundaries, i.e. walls, floors or ceilings. The risk is particularly great in conjunction with empty tubular conduits. For this reason, special relatively complicated fire proof conduits are arranged, although these involve substantially increased costs and extra work, not least for workmen laying cables.

A particular problem is re-laying of cables, especially those for data transmission, when these cables pass through fire cell boundaries, since the connectors attached to the cables form an obstruction.

OBJECT OF THE INVENTION

The object of the present invention is to provide a cable lead-through device of the kind mentioned in the introduction, whereby the above mentioned problem is mitigated to an essential extent.

SUMMARY OF THE INVENTION

The above mentioned object is achieved with the aid of a device having, in accordance with the invention, the distinguishing features which are disclosed in the accompanying claims.

The device in accordance with the invention is thus distinguished substantially in that it includes a cable lead-through tube of a fireproof material, such as a steel tube,

this tube being fireproof mounted so that it extends through the fire cell boundary and projects out from the latter at least on one side of it, this side being the one where there is a fire risk, the projecting tube part having good heat conductivity and being exteriorly exposed, so that heat generated in a fire can be taken up by the tube and conducted through it; an intumescent material arranged on the inside of the tube at least at the projecting tube part, this material having a thickness such that on being heated in conjunction with fire it expands sufficiently for sealing the tube against the passage of fire, gas and smoke; and a seal of fireproof material mounted at least at one end of the tube, this material at least substantially preventing ventilation through the tube when the tube is not sealed by intumescent material expanded by heat.

Since the projecting tube part, which is exposed to fire, is not heat insulated and has good heat conductivity, heat generated in a fire will be rapidly conducted to the intumescent material, which then rapidly expands to completely fill the interior of the tube, irrespective of whether it is empty or has one or more cables passing through it.

Since at least one end of the tube is sealed, gas and smoke are prevented from passing through the tube before the intumescent material has expanded sufficiently for closing off the tube. The seal also prevents fire-extinguishing gas such as Halon from leaving the fire cell at an early stage of the fire.

An end seal can be simply and advantageously obtained by a mineral wool plug being arranged inside the tube, and in appropriate cases around the cable or cables passing through the tube. It is also possible to seal with a fireproof foamed material, e.g. silicon foam. An empty tube which lacks an end connection can be quite simply provided with an end cover. If this is mounted on the side where the risk of fire does not occur, it can be made from optional, ordinary material, since it will not be subjected to any action from fire. From th

saf ty asp ct it is how v r preferable to hav a seal n both sides f th fire cell boundary.

If has been found that the intumescent material can be applied in a thin layer. A typical thickness of the layer can be from about 0,5 to about 2 mm, preferably from about 0,7 to about 1 mm, in connection with normal pipe cross sections. It has been found that an expansion of typically up to about 50 times can be obtained with a desired closing effect. Such material can be Universal 2 KSE for example.

Since the intumescent material layer can be so thin, it does not prevent cable laying through the lead-through tube at all.

An important advantage with the device in accordance with the invention is that the tube can be heavily over-dimensioned in relation to the diameters of the cables which are to pass through it. This facilitates the cable laying itself, of course. In addition, it will be possible to allow the tube to have a cross-sectional area which allows a cable fitted with a cable connector to pass through the tube. This is very useful in connection with re-laying cables in existing systems.

The tube can have a rectangular cross-section, for example, which is suited to connectors which are given a flat configuration. This type of connector is particularly usual in connection with data transmission cables.

In accordance with a particular embodiment of the device in accordance with the invention, the tube is a square tube, where intermediate grating walls have been arranged to form a plurality of separate cable lead-through spaces, the intumescent material being arranged on the inner walls of the square tube as well as on the walls of the gratings. Each separate space can here receive one or more cables. This mbodiment is suitabl for use in c nnecti n with cable bunches with a large number of cables. A particular field of applicati n is in conn ction with cable conduits in steel bulkheads, and in this case th square tube can be pro-

vided with ext ri r, pr f rably circumferential flanges for welding to th bulki d wall.

It is also an advantage with the device in accordance with the invention that the tube included in it can be dimensioned to suit conventional piping systems for cable laying. This means that the tube can be connected to so-called VP or SP piping having standard dimensions.

Fitting the tube in accordance with the invention can thus be done without difficulty by the fitter carrying out the rest of the pipe laying, without this person needing to work with special fireproof cable conduits, which require special knowledge and special tools as well as extra time in fitting.

The invention will now be described in more detail with the aid of exemplifying embodiments and with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 shows a schematic longitudinal section through a first embodiment of a device in accordance with the invention mounted in a plasterboard wall. Figure 2 shows a schematic longitudinal section of a second embodiment of a device in accordance with the invention mounted in a steel bulkhead. Figure 3 is a schematic front view of the device according to figure 2.

DESCRIPTION OF EMBODIMENTS

Figure 1 illustrates how an embodiment of the device in accordance with the invention is mounted in a conventional fire wall made up from double plasterboards 1, 2 on either side of the wall. The plasterboards are conventionally attached to an unillustrated steel structure. The device includes a steel tube 3, extending through the wall in holes mad therein for the purpos . The hol s are given a somewhat ov rsize dimension. After the tub r sl ve 3 has been put into place, a sealing fill t 5 is applied n ither side

where the tube passes int the utmost plasterboard 1. The fillet is made using a fire-classed silic n cement, e.g. DOW CORNING Fire Stop Sealant 3000. The tube 3 projects out on either side of the wall a distance in the order of magnitude 10-15 cm. The projecting tube parts 7, 8 are freely exposed, so that they can be subjected to heat generated in a possible fire. The wall thickness of the tube 3 is typically one or a few mm.

The inner wall of the tube 3 has a thin coating in the form of a layer 9 of intumescent material, e.g. of the fire protective paint Universal 2 KSE. The thickness of the layer is typically somewhat less than 1 mm. The tube can have optional cross section. A cylindrical tube can typically have a diameter of up to about 50 mm, and a square tube with a rectangular cross-section can have a width of typically up to about 50 mm. The height of the cross section can be greater, since the material expansion in the width direction will ensure closure of the tubular section, should there be a fire.

Two cables 11, 12 are passed through the tube 3. Each cable is illustrated as having a flat connector 13 or 14, respectively, at one end. The greatest extension in cross-section of the connectors is less than the height of the tube 3 illustrated in section in Figure 1. It will thus be understood that the cables 11, 12 can have been taken through the tube 3 with the connectors 13, 14 fitted to them, of course providing that the interior extension of the tube at right angles to the plane of the figure is greater than the least extension in cross-section of the connector.

At each end the tube 3 is sealed with the aid of a combination of a mineral wool plug 15, 16 surrounding the cables 11, 12 and a silicon cement layer 17, 18 applied to the utside of the plug. It will be und rstood that these end seals 15, 17 and 16, 18, resp ctively, can b v ry easily rem ved and r fitted if n of the cables is to be rem ved r a further cabl is t be inserted.

In case f fire, both nd seals will prevent v nting thr ugh the tube until the layer 9 has expanded and has thus closed off the interior of the tube 3.

An alternative embodiment of the device in accordance with the invention mounted on a steel bulkhead 21 is illustrated in Figures 2 and 3. A tube 23 having a square cross-section is sealingly attached to the bulkhead 21 by means of a circumferential flange 25 welded on the tube. With the aid of a modular grating 27 the tube 23 is divided into nine like cable lead-through spaces 28. The inner walls of the tube 23 and the wall surfaces of the grating 27 are provided with a layer 29 of intumescent material. A cable 31 is shown passing through one of the spaces 28, which is sealed at either end opening with the aid of a mineral wool plug 33. In a practical case the remaining spaces 28 also are provided with suitable end seals. Of course, the invention is not restricted to the illustrated and described embodiments, and alterations and modifications are possible within the scope of the following claims.

CLAIMS

1. A cable conduit of fireproof heat conducting material wherein the conduit includes intumescent material on the inside thereof, the amount of material being sufficient to ensure that said material expands to close the tube on being exposed to the heat of a fire.

2. A conduit according to claim 1 and further including a seal at one end of the conduit to substantially prevent venting therethrough when the intumescent material is not expanded.

3. A conduit according to claim 1 or claim 2 wherein the intumescent material is applied in the form of a thin layer (9;29) on the inner wall of the tube (3;23).

4. A conduit according to claim 3 wherein the layer (9;29) has a thickness of between about 0,5 and about 2,0 mm.

5. A conduit according to claim 4 wherein the layer is between 0,7 mm and 1,0 mm.

6. A conduit according to any of claims 2-5 wherein said seal (15,17,16,18;33) is of mineral wool (15,16;33).

7. A conduit according to claim 6 wherein said seal further includes a plug of silicon cement (17,18).

8. A conduit according to any preceding claim wherein the tube (3) has a cross-section permitting a cable (11,12) fitted with a connector (13,14) to pass therethrough.

9. A conduit according to claim 8 wherein the tube (3;23) has a r ctangular cross-section adapted to cable connectors (13,14) having a flat configuration.

10. A conduit according to any preceding claim wherein the tube (23) is of rectangular cross-section and has intermediate grating walls (27) arranged so that a plurality of separate cable lead-through spaces (28) are formed, the intumescent material (29) being applied to the inner wall of the tube and to the intermediate grating walls.

11. A conduit according to any preceding claim wherein the tube is adapted to project from the wall by at least 50 mm.

12. A cable lead-through device in a fire cell boundary wherein the device comprises a cable lead-through tube (3;23) of fireproof material, e.g. a steel tube, which is fireproof mounted so that it extends through the fire cell boundary (1,2,21) and projects from the latter at least on one side thereof, there being a risk of fire on this side, the projecting tube part (7,8) having good heat conductivity and being exteriorly exposed so that heat generated during a fire can be taken up by the tube part and conducted through it; an intermescent material (9;29) arranged on the inside of at least the projecting tube part, this material having a thickness such that on being heated in conjunction with a fire it expands sufficiently for closing off the tube against fire, gas and smoke; and a seal (15,17,16,18;33) provided at at least one end of the tube (3;23), this material being of a fireproof material, and at least to a substantial extent preventing venting through the tube, when it is not closed off by intermescent material expanded by heat.

13. A conduit substantially as described herein with reference to the accompanying drawings.

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